# Intersecting Professional Identities and Social Interaction

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## INTRODUCTION

Professional identities play a central role in teachers' learning and development (Beijaard et al., 2004). We draw on this research, particularly the notion that identities are complex, dynamic, social, contextual, multi-faceted constructions (Solari & Ortega, 2020) and that they underscore teachers' pedagogies, affect their motivations to teach, inform their instructional approaches, and guide the way they navigate their profession and execute their roles (Berger & Lê Van, 2019; Sachs, 2005).

A large body of research has explored the identity development of mathematics teachers in teacher education programs and K-12 contexts (e.g., Sachs, 2005), however, there is still limited work examining the professional identity development of individuals involved in higher education mathematics instruction - particularly mathematics teaching assistants (TAs). Mathematics TAs play a crucial role in undergraduate instruction and are, in many ways, early-career mathematics instructors. After their graduate studies, many TAs continue to teach in higher education, but historically, STEM graduate programs have inadequately prepared their students to teach and have done little to help them develop their identities as educators (Hancock & Walsh, 2014).

We draw on this research, particularly the notion that identities are complex, dynamic, social, contextual, multi-faceted constructions (Solari & Ortega, 2020) and that they underscore teachers' pedagogies, affect their motivations to teach, inform their instructional approaches, and guide the way they navigate their profession and execute their roles (Berger & Lê Van, 2019; Sachs, 2005).

## METHODS

This study was conducted at a Minority-Serving Institution in California.

It was a part of a larger project that examined the experiences of transfer students enrolled in a set of courses designed to develop proof-construction competencies and support transfer students' transition to a four-year university.

Purposeful sampling (Creswell, 2013) was used to recruit five PhD students in the mathematics department who served as TAs for an introductory proof course, which was situated in number theory and set theory. These TAs were interviewed and posed with a series of questions that looked at their background, perceived role, structure of the course, and student population.

All participants taught online sections of the course, were in their 2nd or 3rd year of their doctoral program and had prior experiences as TAs.

Below are the three relationship structures that were examined.

### Broader Institutional Context & the Mathematics Discipline

Students ⟷ TAs

TAs ⟷ TAs

TAs ⟷ Faculty
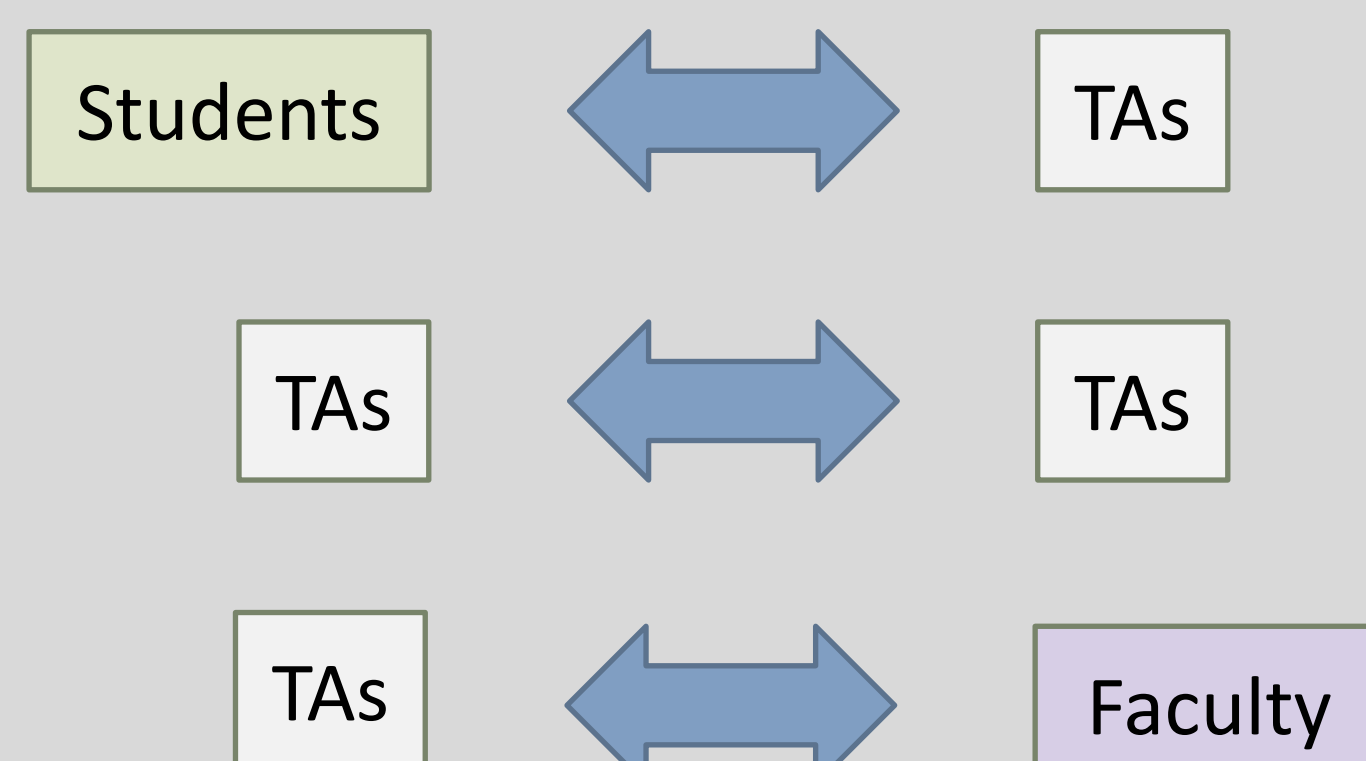
The research team first open-coded the TAs' responses and identified themes in the TAs' reflections. The length of each segment coded was a turn of talk. The team recoded the corpus of data using the following second round codes to describe the complexity and multidimensionality of their professional identities: *content-deliverer, sensemaker, community-builder, assistant, supporter, mentor, resource sharer, learner, beliefs and values, and demeanor.*

## RESULTS

### Professional Identities That Developed from Student-TA Relationships

In this section, we highlight the important aspects of the TAs' professional identities most situated in the relationship between students and TAs.

**Content-Deliverer:** As content-deliverers, the TAs viewed themselves as individuals who delivered mathematics content to students, whether presenting the same content professors lectured on or reviewing material from previous classes.
*Example:* Wyatt explained, "I found that I'm more effective as a TA when I can just cover a lot of material, because my strength is being able to explain it in a digestible way."

**Sensemaker:** The professional identity of sensemaker emerged as TAs shared their engagement in sensemaking efforts of the circumstances and individuals around them. In the social context of Student-TA relationships, the TAs engaged in sensemaking to better understand their students' experiences including students' content knowledge, emotional well-being, challenges related to their university experiences, and difficulties associated with the remote instruction brought upon by the COVID-19 pandemic.
*Example:* Kaitlyn made sense of the challenges the students in her class faced noting: "There's also an intensity that comes with Math A that maybe make students feel a little bit more, I don't know fearful about doing perfect in the class or whatever."

**Community-Builder:** Community-builder referred to the instances when TAs described taking action to build community with students or among students. Most instances of a TA building community took on one of two forms. The TA either worked to create community among students or the TA would talk with students about non-mathematics related topics during office hours.
*Example:* Lisa commented, "I tried to do a lot more of like breakout sections and like try to get students to talk to each other, because I was like you don't ever see each other, trying to talk to each other."

**Supporter:** TAs reflected on how they supported students through encouragement, describing giving emotional support, and advocating for their students; these encompassed the professional identity of supporter. They recognized that part of their professional identities and roles included attending to students' affect and emotions, and they were cognizant of providing students with support throughout the quarter.
*Example:* Nestor described an interaction during one of his synchronous office hours. He said, "I don't know exactly how we ended up there, but I guess she just needed someone to talk to that night, and I was the one for whatever reason, because in Zoom you can't really reach out to anybody else. Right?"



THIS GRAPH SHOWS THE FREQUENCY OF EACH IDENTITY CODE AMONG ALL STUDENT-TA CODED SEGMENTS
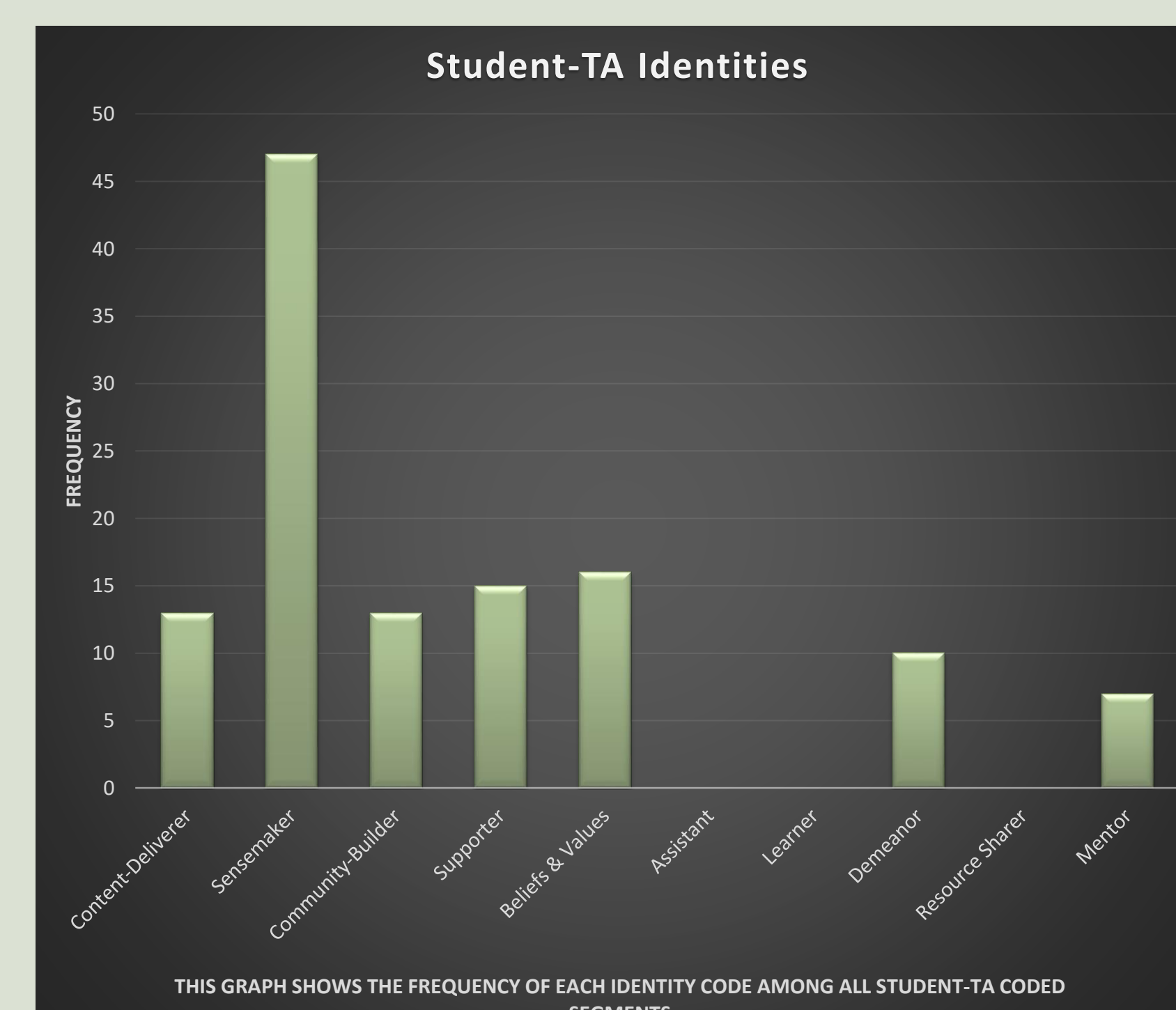
### Professional Identities That Developed from TA-TA Relationships

**Supporter & Resource Sharer**

Reflecting on her experiences with remote instruction, Kaitlyn revealed how the TAs in the mathematics department supported each other by giving advice, and they used various online platforms to share resources that may be useful to address the challenges of conducting sections online. She explained, "I think we gave advice to each other, and we have a Discord [online platform] for our math grads, so people talked about teaching advice and…what programs they like to use, apps they like to use to teach." TAs supported each other by offering advice and directing each other to teaching resources.



THIS GRAPH SHOWS THE FREQUENCY OF EACH IDENTITY CODE AMONG ALL TA-TA CODED SEGMENTS
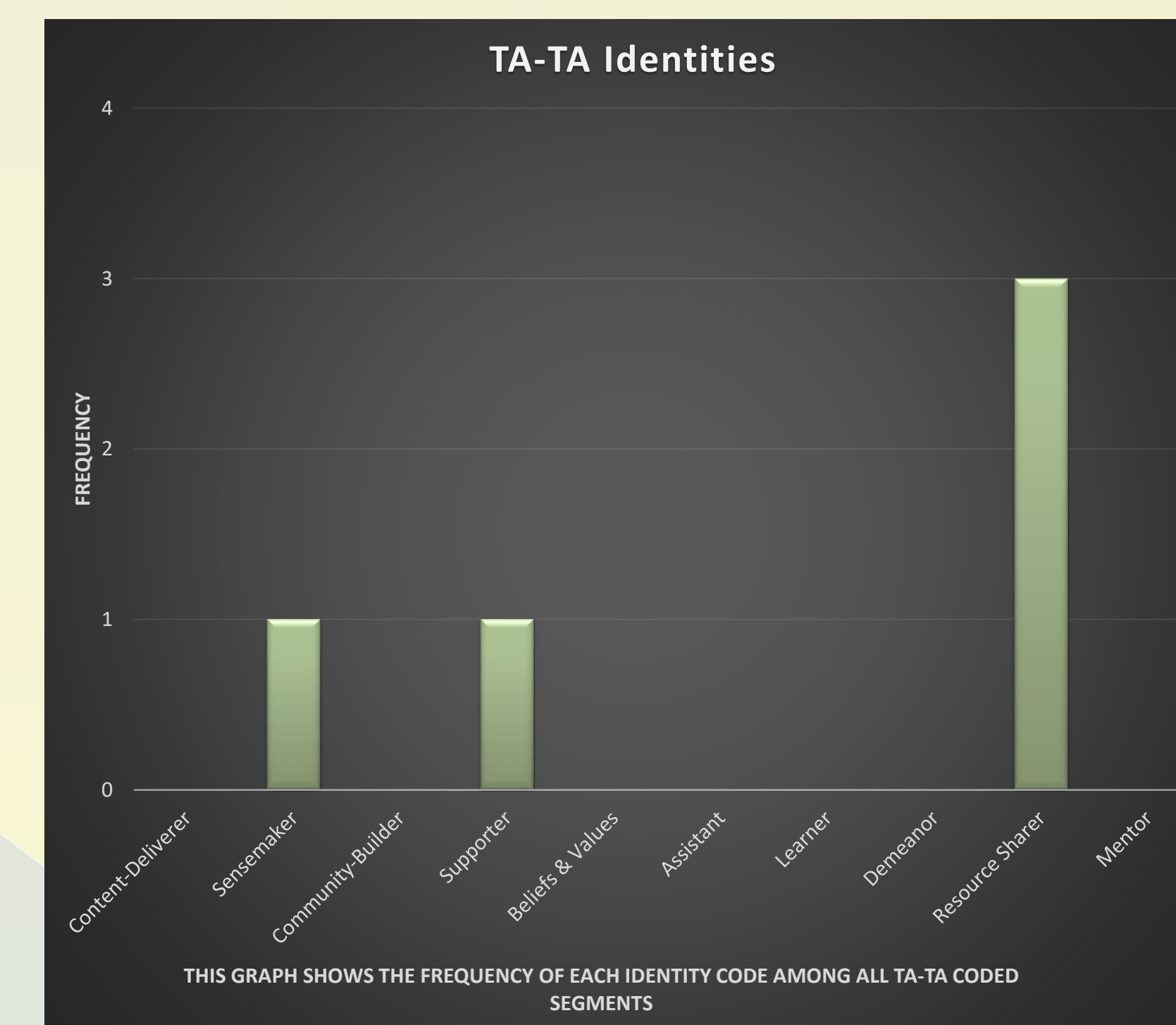
### Professional Identities That Developed from TA-Faculty Relationships

**Assistant:** Quite frequently, the TAs would position themselves as individuals whose purpose and role was to assist or serve the faculty. These notions beset the professional identity of assistant. The TA used words like "helper" or "grader" to signify their role as an assistant to the faculty member with whom they worked.
*Example:* For instance, Lisa shared, "[I] just do some of the grunt work of the grading and background work that needs to get done. You know, it shouldn't lie fully on the professor's hands. Just a helper, a solid helper."

**Learner:** We observed another dimension of professional identity that only appeared in the social context of relationships involving TAs and faculty: learner. TAs described their experiences as learners, both past and present. This illustrated that they were not simply teachers and individuals meant to deliver content or support students. TAs saw themselves as learners of content, learners of pedagogical methods, and learners of resources.
*Example:* Nestor described his experience of learning content in a new way, explaining, "I feel like every time I revisit a concept… I always learned something new, just for myself or like a different perspective, different angle, because the professor looks at it from a different, in a different way."

**Sensemaker:** TAs reflected on their professional identity as sensemakers within Student-TA relationships in instances when the TAs tried to better understand students' experiences. Within the social context of TA-Faculty relationships, sensemaker describes how TAs noticed and made meaning of their relationships, interactions, and experiences with faculty.
*Example:* For example, Wyatt made sense of a faculty's pedagogy and instructional practices, saying, "Well, you know, in an ideal world, of supposing that they had more time to concentrate, I think one thing they could do is just help TAs better know how to grade assignments."



THIS GRAPH SHOWS THE FREQUENCY OF EACH IDENTITY CODE AMONG ALL TA-FACULTY CODED SEGMENTS
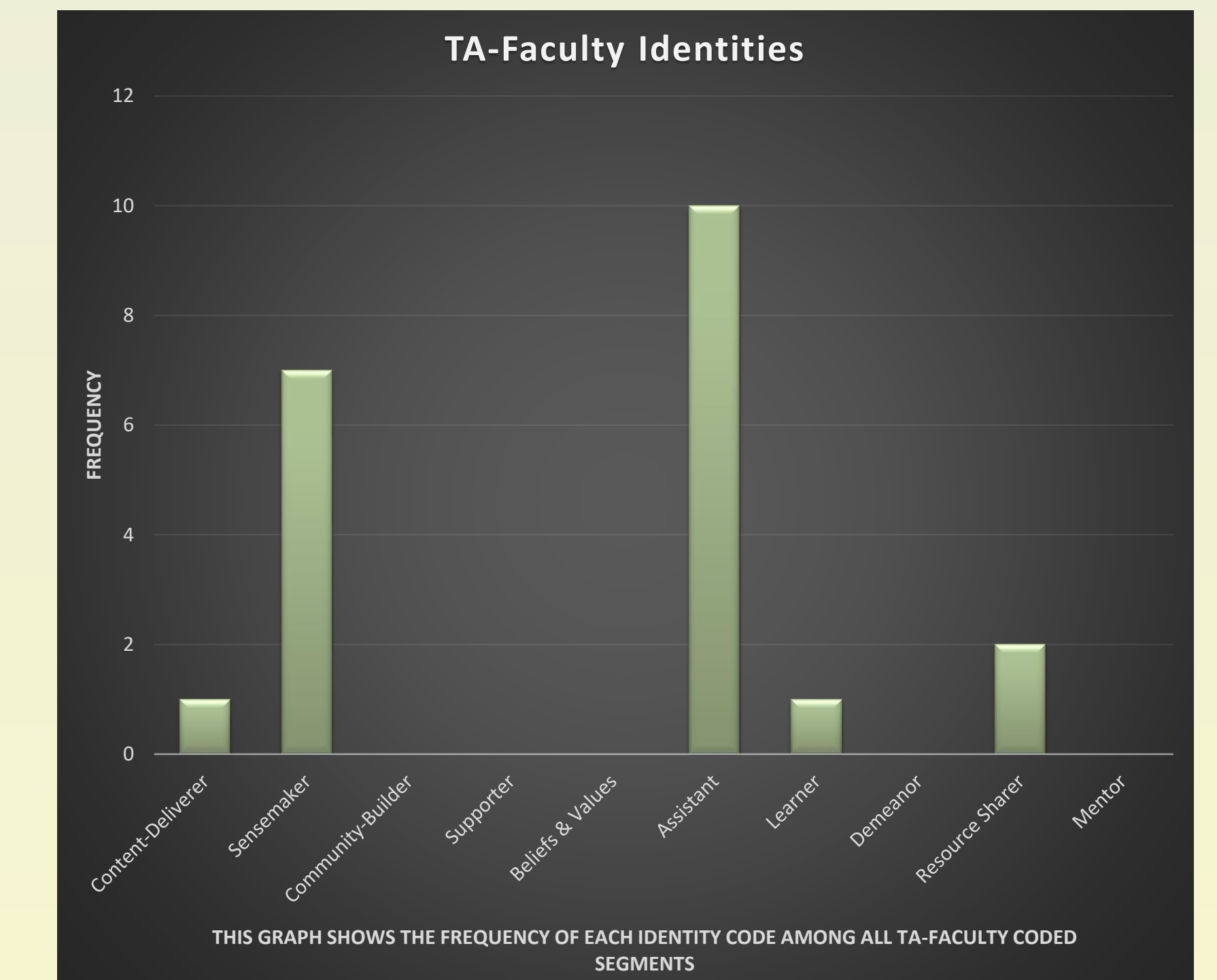
## CONCLUSION

The professional identities of mathematics instructors in higher education is still a largely under-researched area of mathematics education. With many mathematics graduate students continuing to become teaching faculty themselves, it is imperative that we examine how their professional identities are developed, particularly related to their experiences as TAs.

The professional identities that mathematics TAs develop through their social interactions and relationships with members of their professional community not only influence their current positions as TAs but provide a foundation for their future careers, pedagogies, and practices. Identity development is a constant process throughout the careers of mathematics educators, and it is important to acknowledge that even prior to formal appointments as a teaching faculty, their experiences – such as serving as TAs during their graduate programs – have already shaped their professional identities.

A sociocultural perspective of identity development affords a lens through which researchers can identify and examine the extent to which experiences related to being a teaching assistant impact the development of professional identity as a mathematics instructor. Understanding the nuances and complexities of how professional identities of future educators are developed can inform higher education institutions on how to better develop positive professional identities of mathematics graduate students.

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